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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/964,375	09/28/2001	Jong-Seo Choi	P56533	2237
7590	11/26/2003		EXAMINER	
Robert E. Bushnell Suite 300 1522 K Street, N.W. Washington, DC 20005			QUARTERMAN, KEVIN J	
			ART UNIT	PAPER NUMBER
			2879	

DATE MAILED: 11/26/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/964,375	<b>Applicant(s)</b> CHOI ET AL.	
	<b>Examiner</b> Kevin Quarterman	<b>Art Unit</b> 2879	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1) ☒ Responsive to communication(s) filed on 02 September 2003.

2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4) ☒ Claim(s) 1,3-7,10-17,20-23,25-29 and 32-47 is/are pending in the application.  
     4a) Of the above claim(s) 35-47 is/are withdrawn from consideration.

5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.

6) ☒ Claim(s) 1,3-6,10-16,20-23,25-28 and 32-34 is/are rejected.

7) ☒ Claim(s) 7,17 and 29 is/are objected to.

8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. §§ 119 and 120**

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \*    c) ☐ None of:  
         1. ☐ Certified copies of the priority documents have been received.  
         2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
         3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
     \* See the attached detailed Office action for a list of the certified copies not received.

13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
     a) ☐ The translation of the foreign language provisional application has been received.

14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

**Attachment(s)**

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)
3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____	6) <input type="checkbox"/> Other: _____

**DETAILED ACTION**

***Response to Amendment***

1. Applicant's amendment filed on 02 September 2003 has been entered and is sufficient to overcome the objection to the specification.

***Election/Restrictions***

2. Newly submitted claims 35-47 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons:
3. The inventions are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the cathode for an electron tube can be made by preparing a carbonate paste containing needle-shaped conductive material, coating the carbonate paste onto a metal base, and then calcining to form an electron-emitting layer.
4. Because these inventions are distinct for the reasons given above and the search required for the original invention is not required for the new invention, restriction for examination purposes as indicated is proper.
5. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art because of their recognized divergent subject matter, restriction for examination purposes as indicated is proper.

6. Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 35-47 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1, 3-5, 10-15, 23, and 25-27 are rejected under 35 U.S.C. 102(e) as being anticipated by Uemura (US 6239547).

9. Regarding independent claim 1, Figure 9B of Uemura shows a cathode for an electron tube comprising a metal base (905) and an electron-emitting material (903) coated on the metal base, the electron-emitting material layer comprising a needle-shaped conductive material (col. 2, ln. 53), the needle-shaped conductive material being at least one selected from a group consisting essentially of carbon, indium tin oxide, nickel, magnesium, rhenium, molybdenum, and platinum (col. 2, ln. 48-53).

10. Regarding claim 3, Uemura discloses the needle-shaped conductive material being a carbonaceous material (col. 2, ln. 48-53).

11. Regarding independent claim 4, Uemura discloses like limitations of independent claim 1, as discussed earlier. Uemura also discloses the needle-shaped conductive material being a carbonaceous material selected from the group consisting essentially of a carbon nanotube, carbon fiber, and graphite fiber (col. 2, ln. 48-53).

12. Regarding claim 5, Uemura discloses the carbonaceous material being a carbon nanotube (col. 2, ln. 48-53).

13. Regarding independent claim 10, Uemura discloses like limitations of independent claim 1, as discussed earlier. Uemura discloses also discloses a flat electron-emitting surface (col. 16, ln. 29-39), thereby producing a surface roughness corresponding to a distance between the highest point and the lowest point on the surface of the electron-emitting material layer being less than 10 microns.

14. Regarding claim 11, Uemura discloses the cathode being an oxide cathode (col. 2, ln. 26).

15. Regarding claim 12, Uemura discloses the needle-shaped conductive material being at least one material selected from a group consisting essentially of carbon, indium tin oxide, nickel, magnesium, rhenium, molybdenum, and platinum (col. 2, ln. 48-53).

16. Regarding claim 13, Uemura discloses the needle-shaped conductive material being a carbonaceous material (col. 2, ln. 48-53).

17. Regarding claim 14, Uemura discloses the needle-shaped conductive material being a carbonaceous material selected from the group consisting essentially of a carbon nanotube, carbon fiber, and graphite fiber (col. 2, ln. 48-53).

18. Regarding claim 15, Uemura discloses the carbonaceous material being a carbon nanotube (col. 2, ln. 48-53).

19. Regarding independent claim 23, Figure 9B of Uemura shows an oxide cathode for an electron tube comprising a metal base (905) and an electron-emitting material (903) coated on the metal base, the electron-emitting material layer comprising a needle-shaped conductive material (col. 2, ln. 53), the needle-shaped conductive material being at least one selected from a group consisting essentially of carbon, indium tin oxide, nickel, magnesium, rhenium, molybdenum, and platinum (col. 2, ln. 48-53).

20. Regarding claim 25, Uemura discloses the needle-shaped conductive material being a carbonaceous material (col. 2, ln. 48-53).

21. Regarding independent claim 26, Figure 9B of Uemura shows an oxide cathode for an electron tube comprising a metal base (905) and an electron-emitting material (903) coated on the metal base, the electron-emitting material layer comprising a needle-shaped conductive material (col. 2, ln. 53), the carbonaceous material selected from the group consisting essentially of a carbon nanotube, carbon fiber, and graphite fiber (col. 2, ln. 48-53).

22. Regarding claim 27, Uemura discloses the carbonaceous material being a carbon nanotube (col. 2, ln. 48-53).

23. Claims 6, 16, and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Koizumi (US 5216320).

24. Regarding independent claims 6, 16, and 28, Figure 1 of Koizumi shows an oxide cathode for an electron tube comprising a metal base (2) and an electron-emitting material layer (3) coated on the metal base, the electron-emitting material comprising a needle-shaped conductive material (col. 2, ln. 63), the needle-shaped conductive material in the electron-emitting material layer being in a range of 0.01 to 30% by weight based on a total weight of the electron-emitting material (col. 2, ln. 52-60).

***Claim Rejections - 35 USC § 103***

25. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

26. Claims 20-22 and 32-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uemura (US 6239547) in view of Ando (US 4349766).

27. Uemura discloses the limitations of independent claim 11, as discussed earlier. Regarding claims 20 and 32, Uemura fails to exemplify a metal layer including nickel grains having sizes smaller than the grains in the metal base, the metal layer formed between the metal base and the electron-emitting material layer.

28. Regarding claims 21 and 33, Uemura also fails to exemplify the metal layer further including at least one metal selected from the group consisting essentially of aluminum, tungsten, tantalum, chromium, magnesium, silicon, and zirconium.

29. Regarding claims 22 and 34, Uemura also fails to exemplify the thickness of the metal layer being in the range of 1 to 30 $\mu$ m.

30. Figure 1 of Ando teaches that it is known in the art to provide cathodes for an electron tube with a metal layer (2) including nickel grains having sizes smaller than the grains in the metal base layer (5), the metal layer formed between the metal base and the electron-emitting material layer (3). Ando also discloses that the metal layer further includes tungsten (col. 3, ln. 26). Ando also discloses that this metal layer is provided in the cathode structure for firmly fixing the electron-emitting layer to the base metal (col. 3, ln. 16-19).

31. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the cathode structure of Uemura with the metal layer formed between the metal and the electron-emitting material layer, as taught by Ando, for improving the cathode structure.

***Allowable Subject Matter***

32. Claims 7, 17, and 29 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

33. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record neither shows or suggests a cathode for an electron tube



comprising an electron-emitting material layer comprising, in addition to other limitations of the base claims, a needle-shaped conductive material being a carbonaceous material, the needle-shaped conductive material being in a range of 0.01 to 30% by weight based on a total weight of the electron-emitting material layer, and a thickness of the electron-emitting material layer being in a range of 30 to 80µm.

### ***Response to Arguments***

34. In response to applicant's argument that Uemura does not disclose or suggest the materials from the group recited in claims 2 and 24, the Examiner respectfully disagrees. On page 19 of applicant's response, applicant recognizes that Uemura discloses the electron-emitting sources being made of carbon nanotubes. The Examiner notes that carbon is included in the group of materials recited in claims 2 and 24. Thus, the Examiner holds that Uemura does indeed disclose the electron-emitting material layer having at least one material selected from the group consisting essentially of carbon, indium tin oxide, nickel, magnesium, rhenium, molybdenum, and platinum—namely, carbon.

35. In response to applicant's argument that there is no specific reference in Uemura to the use of carbon *fiber* and graphite *fiber* as candidates for carbonaceous material forming the needle-shaped conductive material of the electron-emitting material layer, the Examiner notes that a *fiber* is defined as a long slender thread or filament. Figure 9B of Uemura shows carbon fibers (903) forming the needle-shaped conductive material of the electron-emitting material layer.

36. In response to applicant's argument that Uemura has a different technical field of invention since Uemura relates to an electron-emitting source while the present invention relates to a cathode for an electron tube, the Examiner notes that Uemura discloses electron-emitting source is used in an electron gun (cathode) as a constituent of a picture tube (col. 1, ln. 9-10). Thus, the Examiner submits that the technical fields of both inventions are analogous.

37. In response to applicant's argument that Uemura uses only carbon nanotube while the present invention uses a paste mixture of carbon nanotube, carbonate, metal alkoxide etc., the limitations on which applicant relies are not stated in the claims. It is the claims that define the claimed invention and it is the claims, not specification, that are anticipated or unpatentable.

38. Applicant's arguments with respect to claims 6, 10, and 28 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

39. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Yamauchi (US 6565402) and Yamauchi (US 6351061) both disclose a cathode and picture tube. Hayashida (US 6565916) discloses an oxide cathode.

**Contact Information**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Quarterman whose telephone number is (703) 308-6546. The examiner can normally be reached on M-F (8-4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (703) 305-4794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7382 for regular communications and (703) 308-7382 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Kevin Quarterman  
Examiner  
Art Unit 2879

kq   
November 13, 2003

  
for

**Nimesh Patel**  
**Supervisory Patent Examiner**  
**Art Unit 2879**